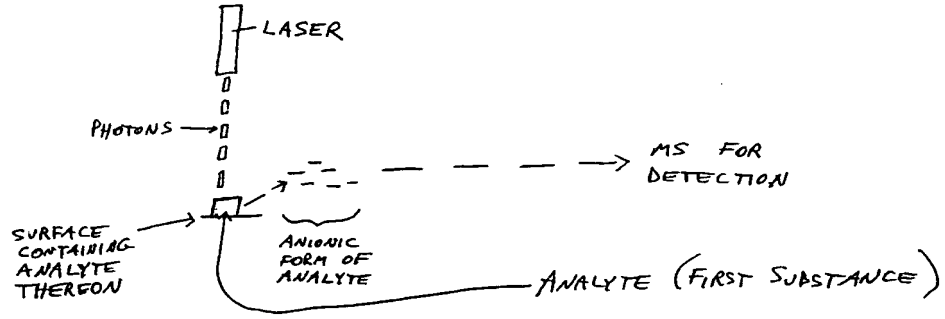
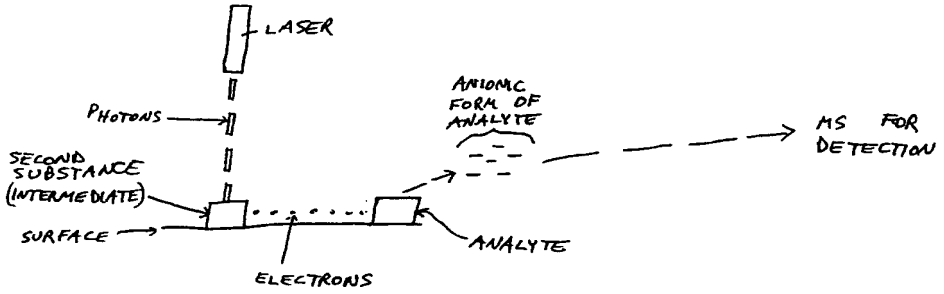
FIG. 1: LI-EC-MS

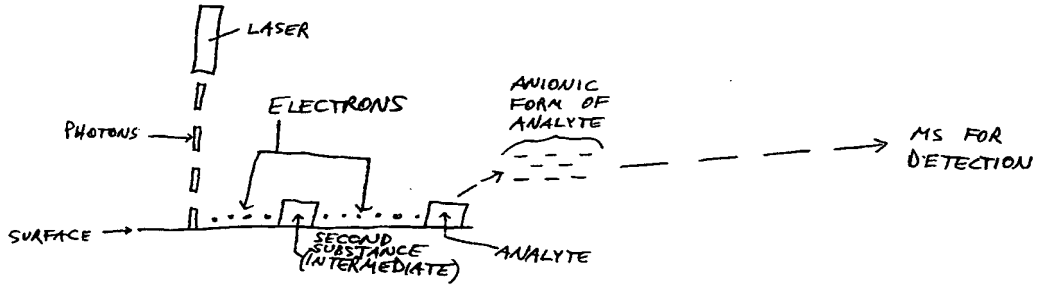
(A) ELECTRONS FROM SURFACE TO ANALYTE




(B) ELECTRONS FROM INTERMEDIATE TO ANALYTE




(C) ELECTRONS FROM SURFACE TO INTERMEDIATE TO ANALYTE



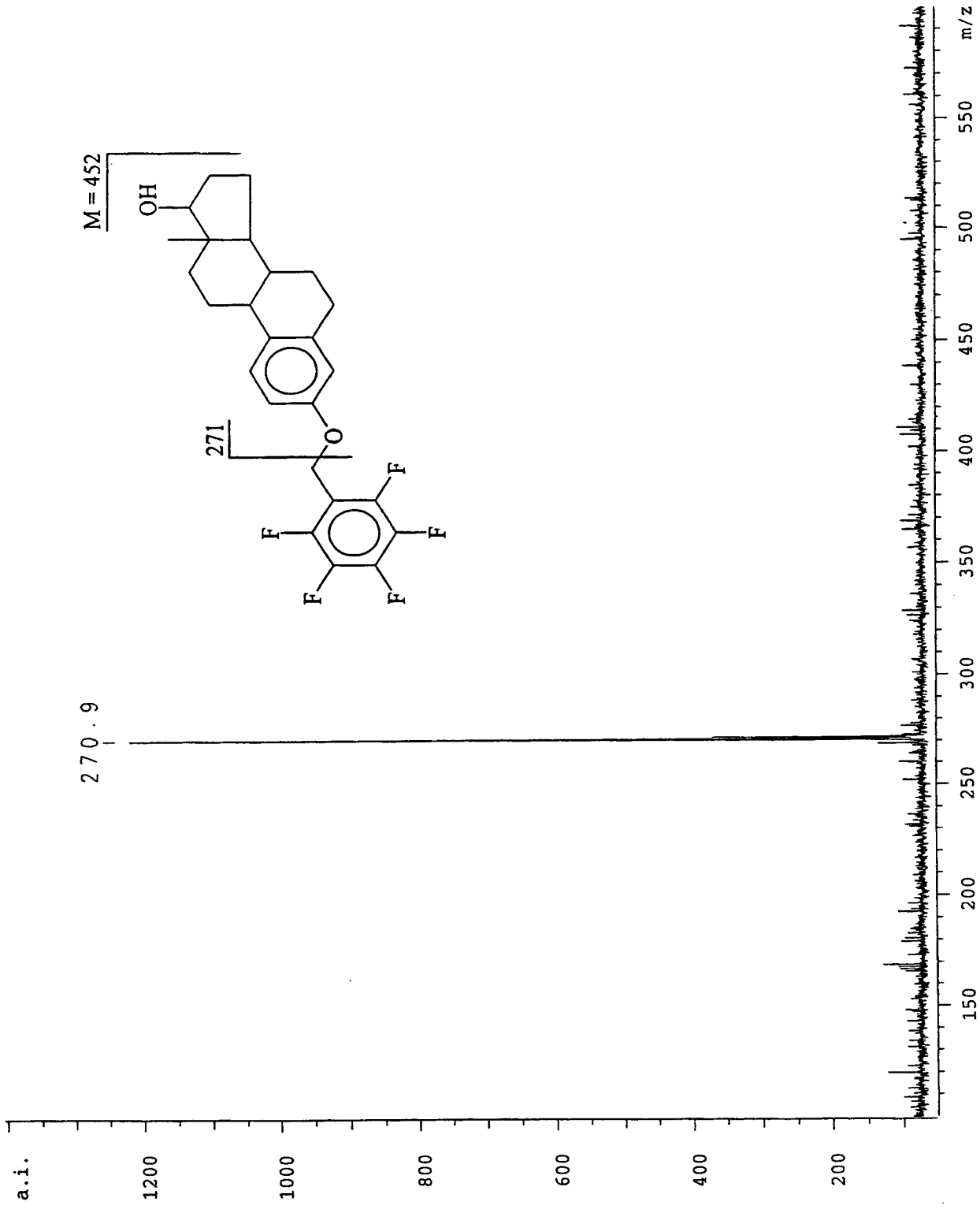

a.i.
1200
1000
800
600
400
200
150
200
250
300
350
400
450
500
550
m/z
270.9
M=452
OH
271
O
F
F
F
F
F

Fig. 2

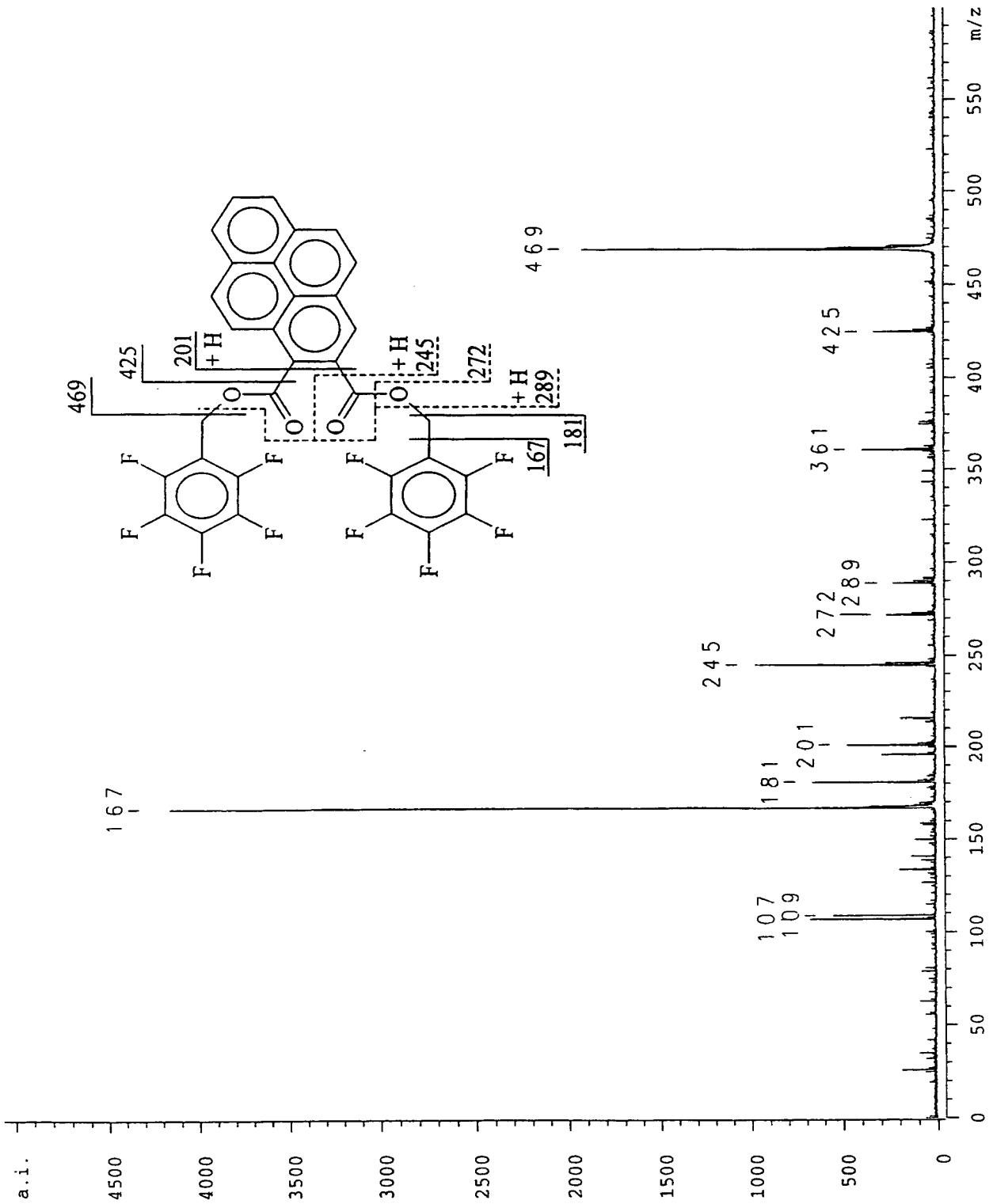

a.i.
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0
50
100
150
200
250
300
350
400
450
500
550
m/z
167
107
109
181
201
245
272
289
361
425
469
469
425
201
+H
245
+H
272
+H
289
167
181
O
O
O
O
F
F
F
F
F
F
F
F
F
F

Fig. 3

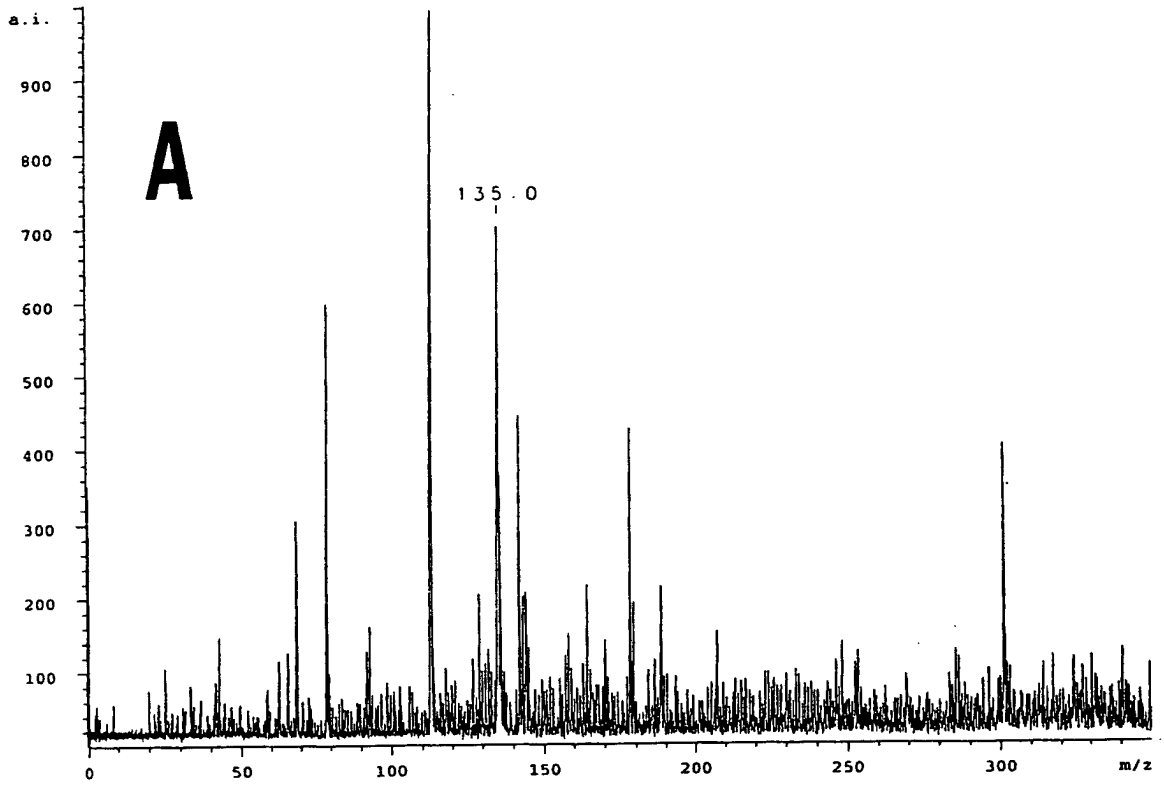

a.i.
A
135.0
900
800
700
600
500
400
300
200
100
0
50
100
150
200
250
300
m/z

Fig. 4a

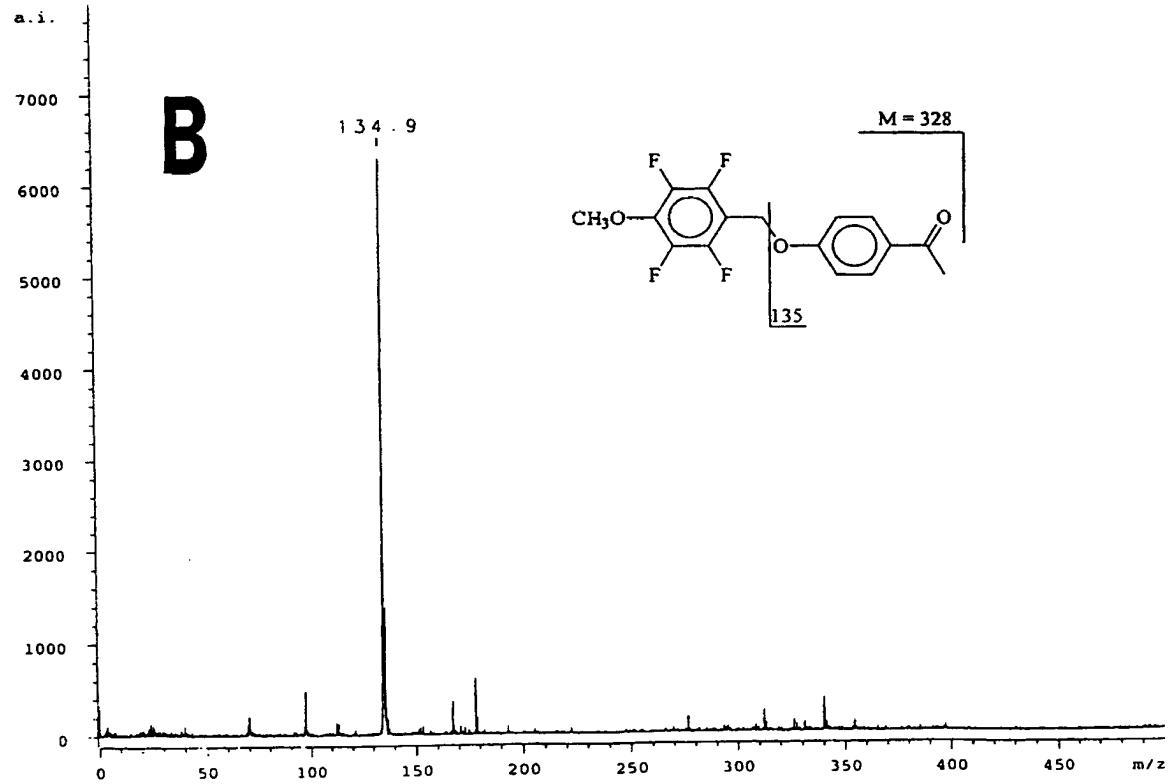

a.i.
B
134.9
M = 328
F
F
CH3O
O
O
F
F
135
7000
6000
5000
4000
3000
2000
1000
0
0
50
100
150
200
250
300
350
400
450
m/z

Fig. 4b

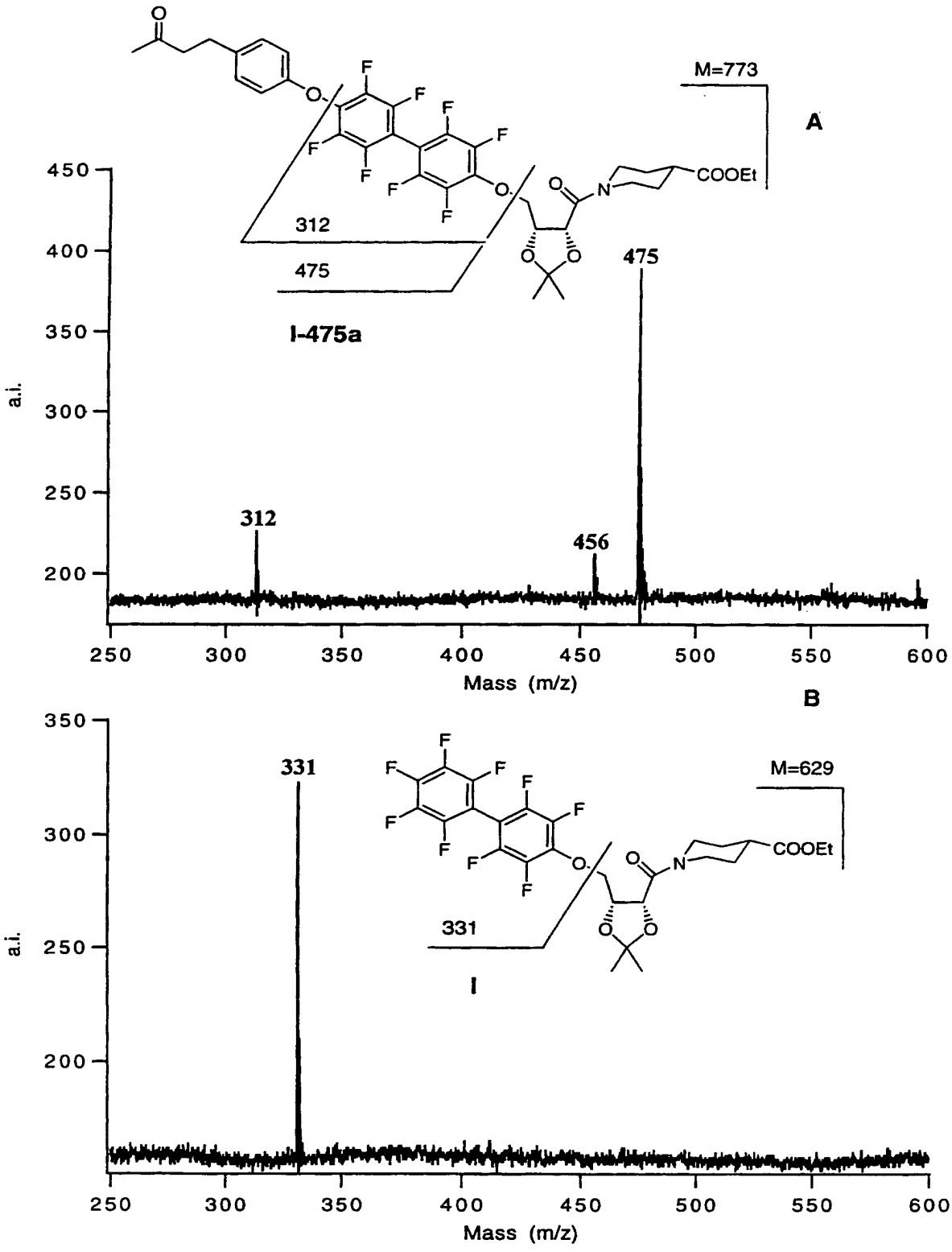
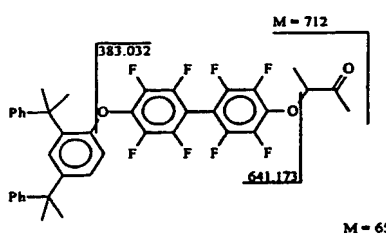
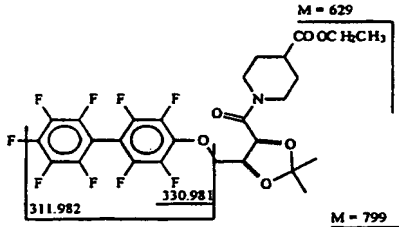

M=773
A
312
475
I-475a
475
456
312
a.i.
Mass (m/z)
B
M=629
331
331
I
a.i.
Mass (m/z)

Fig. 5

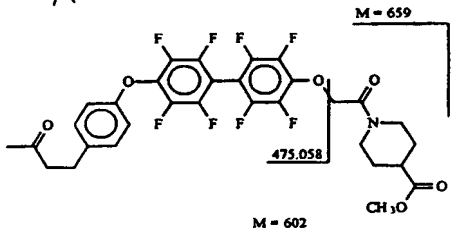
III-641a



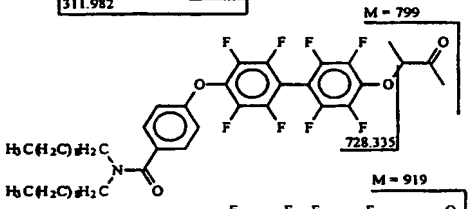

I-331a



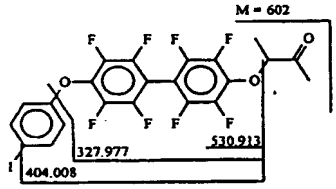

II-475a



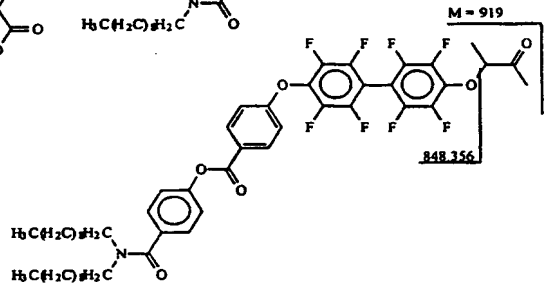

III-728a




III-531a




III-848a



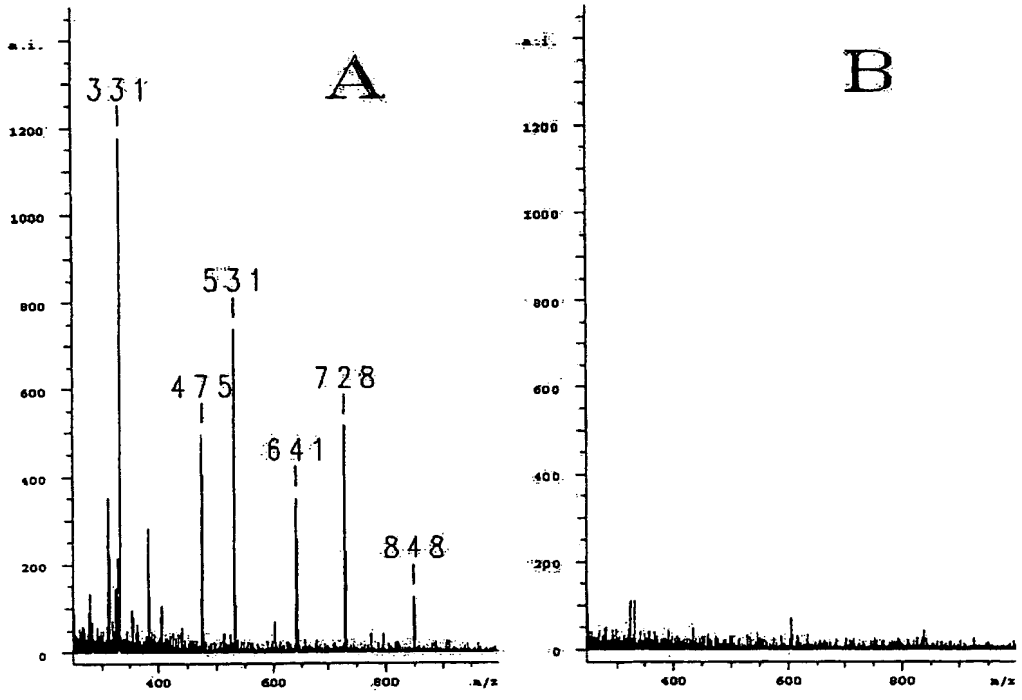




Fig. 6

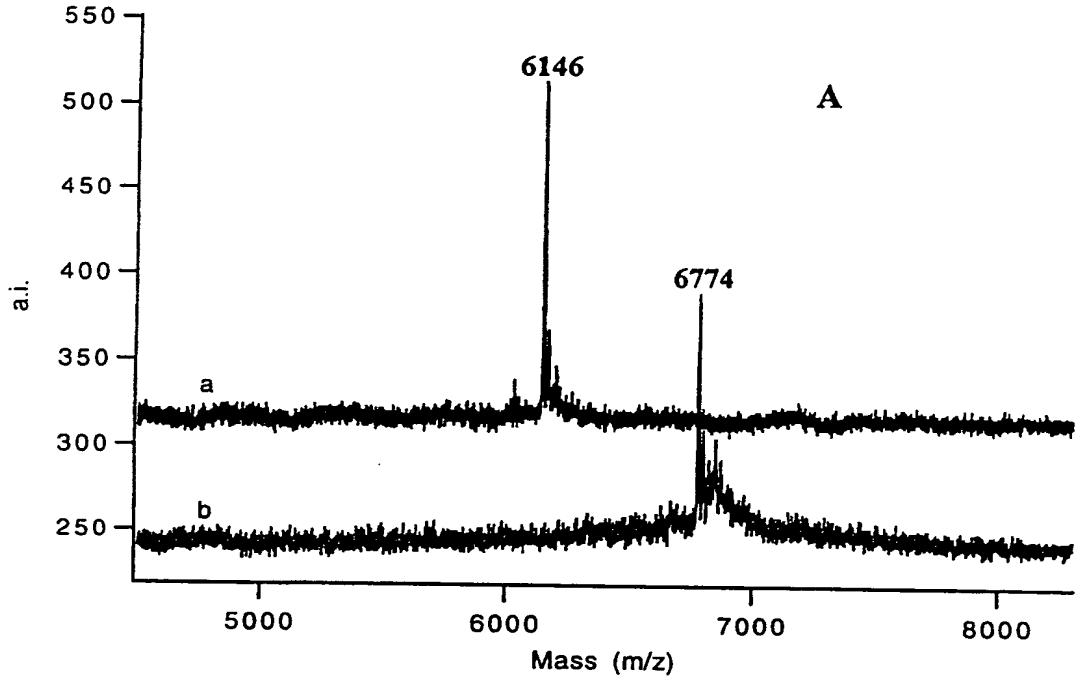

A
6146
6774
a
b
a.i.
550
500
450
400
350
300
250
5000
6000
7000
8000
Mass (m/z)

Fig. 7a

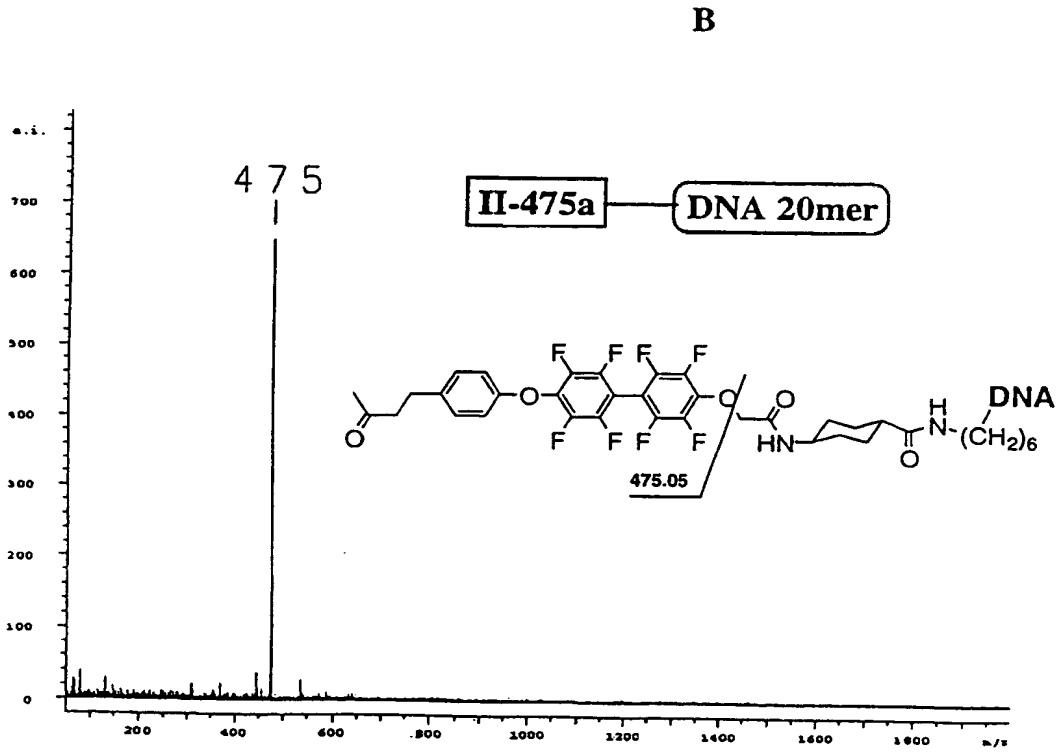

B
475
II-475a
DNA 20mer
DNA
475.05
a.i.
700
600
500
400
300
200
100
0
200
400
600
800
1000
1200
1400
1600
1800
m/z

Fig. 7b

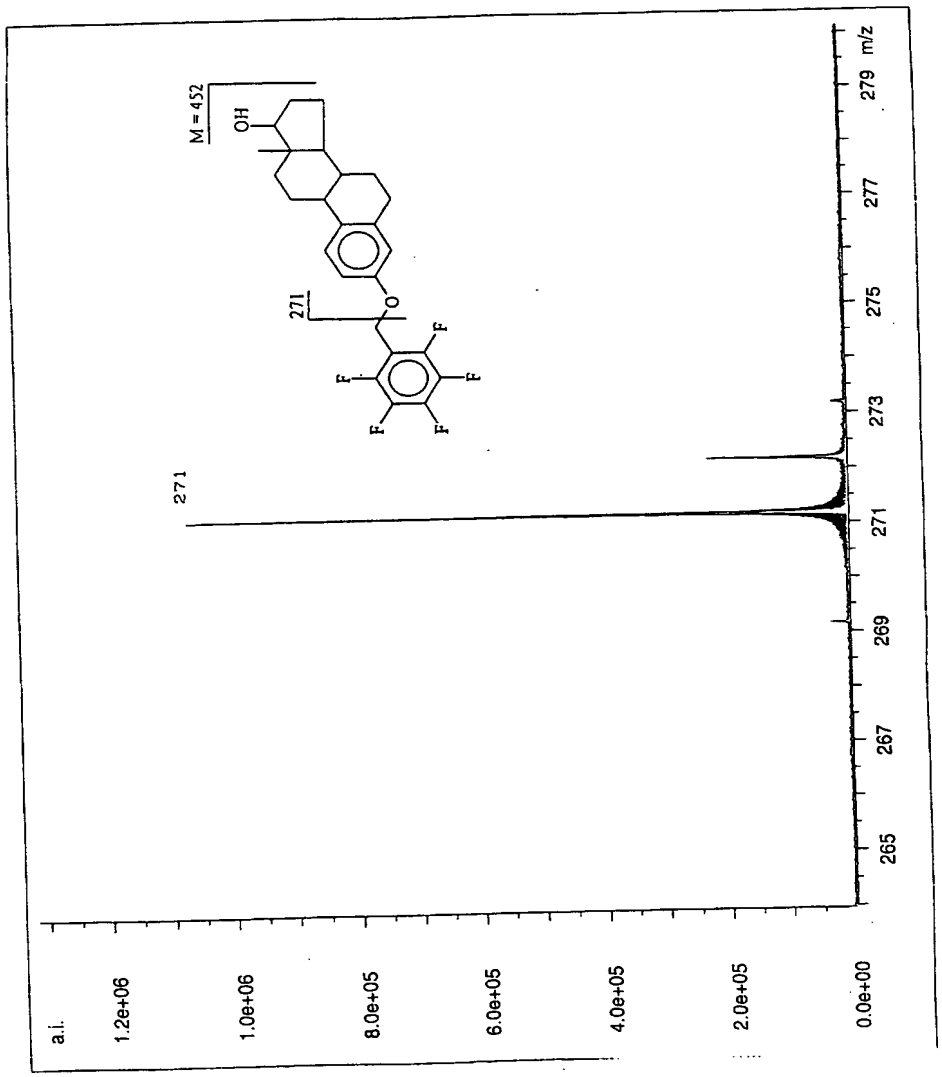

a.i.
1.2e+06
1.0e+06
8.0e+05
6.0e+05
4.0e+05
2.0e+05
0.0e+00
265
267
269
271
273
275
277
279 m/z
271
M = 452
OH
271
O
F
F
F
F
F

Fig. 8

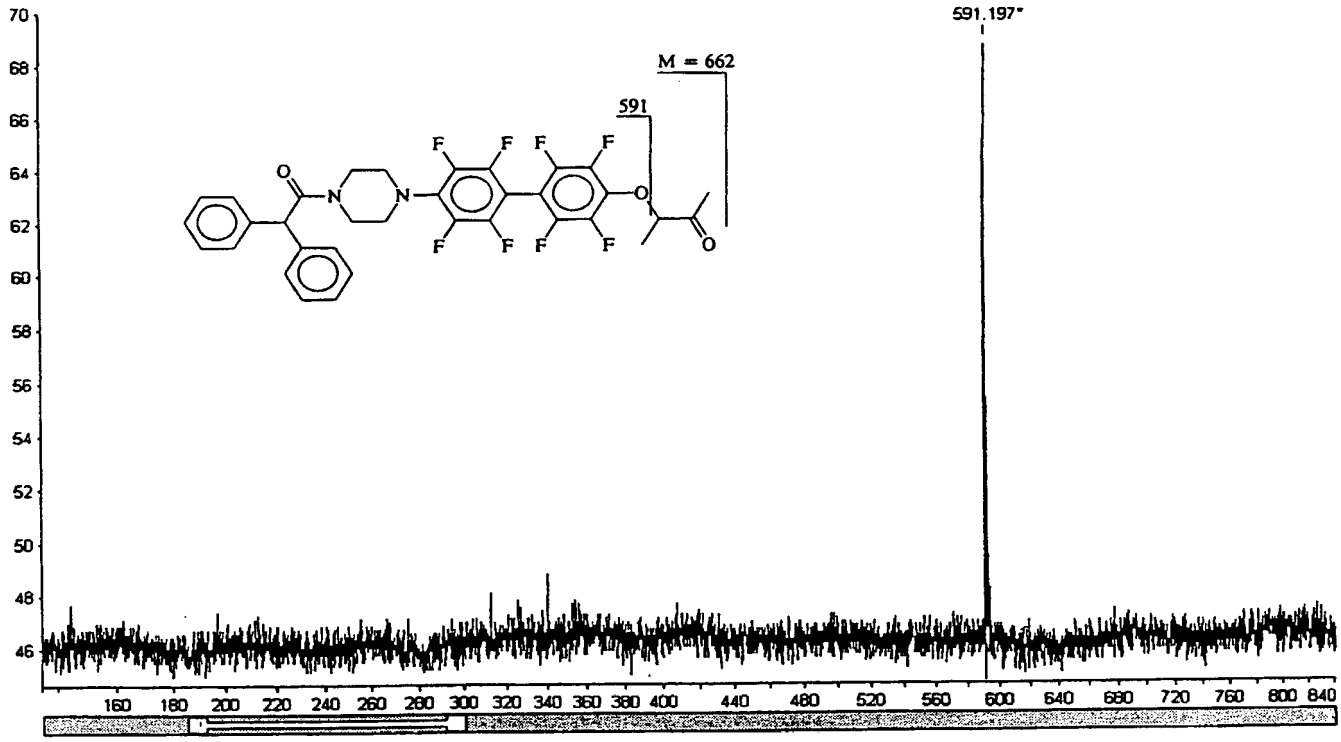

591.197*
M = 662
591
70
68
66
64
62
60
58
56
54
52
50
48
46
160 180 200 220 240 260 280 300 320 340 360 380 400 440 480 520 560 600 640 680 720 760 800 840

Fig. 9

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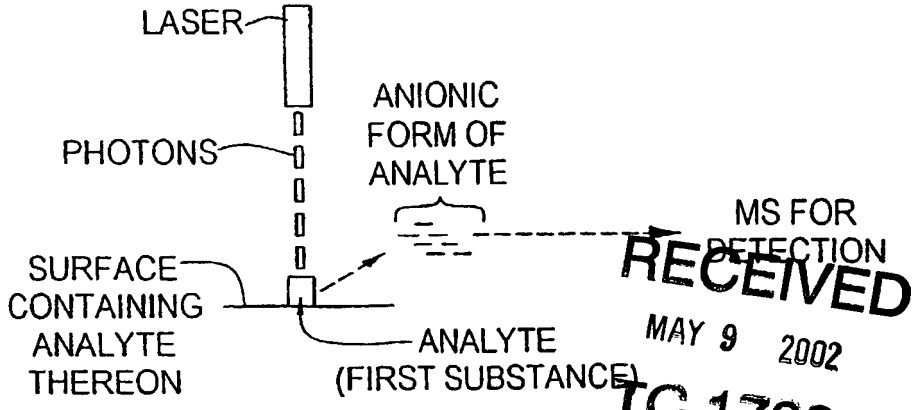
(54) Title: LIGHT-INDUCED ELECTRON CAPTURE AT A SURFACE






(57) Abstract: A method for increasing the performance and usefulness of laser induced electron capture mass spectrometry (LI-EC-MS). Light (photons) from a light source (laser), is used to activate an electron of a surface, preferably a metal surface, where the light energy is below the work function of the surface. The electron is transferred to an analyte on the surface, forming an anionic product from the analyte. The anionic product can simultaneously undergo desorption for detection in a mass spectrometer. Alternatively, the analyte (first substance) can receive an electron from an intermediate compound having a low ionization potential which is deposited with the analyte. This gives a sharpener or more intense signal from an analyte than prior forms of LI-EC-MS, but utilizes ordinary MS equipment. Further, the procedure even enables detection of species, such as nucleic acids labeled with polyfluoro-containing groups, that previously were beyond the reach of LI-EC-MS techniques.

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